

REMARKS/ARGUMENTS

The claims are 3-5 and 7-15. Claim 1 has been canceled in favor of new claim 15 to better define the invention.

Accordingly, claims 3, 4, 7-9 and 14, which previously depended on claim 1, have been amended to depend on new claim 15. These claims and claims 5 and 10-13 have also been amended to improve their form or to delete reference numerals. In addition, claims 2 and 6 have been canceled. Support for the claims may be found, *inter alia*, in FIGS. 1-2, pages 6-8 and 12-13, and the original claims. Reconsideration is expressly requested.

Claims 3, 7, and 11-12 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for the reasons set forth on page 2 of the Office Action. In response, Applicants have, *inter alia*, amended claims 3, 7 and 11-12 to improve their form, which it is respectfully submitted overcomes the Examiner's rejection under 35 U.S.C. 112, second paragraph.

Claims 1-7 and 14 were rejected under 35 U.S.C. 102(b) as being anticipated by *Schmitz U.S. Patent No. 3,724,076*. The remaining claims were rejected under 35 U.S.C. 103(a) as being unpatentable over *Schmitz*, in view of *Fischione U.S. Patent No.*

4,655,749 (claim 8), *Fischione and Baidwan et al.* U.S. Patent No. 5,238,003 (claim 11), *Fischione and Kvitrud* U.S. Patent No. 4,632,672 (claim 12), or *Century* U.S. Patent No. 5,513,630 (claims 9, 10 and 13).

This rejection is respectfully traversed.

As set forth in new claim 15, Applicants' invention provides an injection pump for application of highly viscous media that have to be applied with pressure during percutaneous vertebroplasty. The pump includes a pump body having a pump body proximal end, a pump body distal end, and a pump body length. A pump body grip is fastened at the pump body proximal end.

The pump also includes a piston system having a rigid first piston rod, a flexible second piston rod, a first piston rod grip, and an end piston head. The rigid first piston rod has a first piston rod proximal end and a first piston rod distal end. The flexible second piston rod is connected to the first piston rod at the first piston rod distal end and has a second piston rod distal end. The first piston rod grip is connected to the first piston rod at the first piston rod proximal end. The end piston head is arranged at the second piston rod distal end for

taking up bone cement. The end piston head is movable along the pump body length between the pump body distal end and the pump body proximal end.

In this way, Applicants' invention provides an injection pump in which the piston can travel along the entire length of pump body 3 as shown in FIGS. 1 and 2. As shown in FIG. 1, markings 4 are provided along the entire length of pump body 3 to indicate the bone cement content resulting from movement of the piston. As shown in FIG. 2, the pump body has a homogenous diameter along its entire length allowing piston 11 to travel along the entire length of pump body 3. The rigid piston rod 6 can be fully retracted into grip 5 and even flexible piston rod 9 can be almost fully retracted into grip 5.

The long travel of piston 11 along the entire length of pump body 3 allows sufficient bone cement to be taken up into pump body 3. The diameter of the piston head (and the diameter of pump body 3) is small enough to avoid too much counter pressure (too much resistance) when grip 7 is pushed towards grip 5 in order to eject the bone cement.

None of the cited references discloses or suggests an injection pump for application of highly viscous media wherein the end piston head is movable along the pump body length between a pump body distal end and a pump body proximal end. The primary reference to *Schmitz* discloses a dental cement gun in which piston 42 has only a very short travel along the very distal end of the instrument. The proximal part of the instrument serves only as a plunger guide tube and not as a chamber for taking in bone cement. Note that FIG. 2 of *Schmitz* shows piston 42 in its most proximal position where it abuts against the plunger guide tip 28. Accordingly, the concept of a small diameter along travel injection pump as shown in Applicants' FIG. 2, for example, is nowhere disclosed or suggested in *Schmitz*. As shown in Applicants' FIG. 2, the inner diameter of pump body 3 corresponds to the outer diameter of piston 12 or sealing rings 13, respectively. There is no such disclosure or suggestion in *Schmitz* of an injection pump as recited in Applicants' new claim 15, in which the pump body 3, rigid piston rod 6, flexible piston rod 9 and piston head 11 are designed so that they allow for travel of a piston head 11 along the entire length of pump body 3.

The secondary references to *Fischione, Baidwan et al.*, *Kvitrud*, and *Century* have been considered but are believed to be no more pertinent. *Century* simply discloses a luer lock. The remaining references simply refer to details of the piston design. None of these references discloses or suggests an injection pump for application of highly viscous media wherein an end piston head is movable along the pump body length between a pump body distal end and a pump body proximal end.

In summary, claims 3-5 and 7-14 have been amended, claims 1-2 and 6 have been canceled, and new claim 15 has been added. In view of the foregoing, it is respectfully requested that the claims be allowed and that this case be passed to issue.

Respectfully submitted,

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Enclosures: Petition - 1 month extension of time

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on January 23, 2009.


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